
CHAPTER FIVE SPILLS/DUMPING

The widespread destruction of habitat that resulted from the Exxon Valdez oil spill galvanized public demand for responsible handling of marine transported oil and hazardous materials. Public officials have responded with a flurry of new contingency planning, creating a complex framework for spill prevention and response implications of which are not yet clear. Policymakers at all levels of government are revising existing contingency plans, while state legislators are enacting stringent new laws in an attempt to protect their inland and coastal waters. Few of the laws or plans even consider the small spills which continue at the rate of two per day in the bay.

This chapter evaluates the very separate regulatory frameworks for spills and dumping. The two have in common that prevention would be far preferable to any regulations concerning cleanup; at the same time, incentives for prevention are low or even counterproductive, as when properly disposing of wastes costs more than dumping them in the water. Thus spills and dumping are added to our growing list of environmental problems that are dispersed in nature and require changes in individuals' habits.

SPILLS

In Galveston Bay, oil refining and petrochemical industries comprising a substantial portion of the local economy compete with some of the nation's most valuable habitats and breeding grounds for migratory birds, fish, and shellfish. Not surprisingly, small spills of toxics, oil, fuel, and other pollutants are a common occurrence in the bay. The Galveston Coast Guard office, which keeps an updated spills log, receives on average two reported spills a day. The large majority of these spills are recorded as non-violations requiring no clean up action. However, heavy vessel traffic to and from onshore facilities, and frequent transfer and lightering activities put Galveston Bay in the high risk category for catastrophic spills as well.

Because crude oil and petroleum products account for the vast majority of Texas waterborne commerce, the bay area is particularly susceptible to oil spills. Waterborne commerce statistics issued by the Corps of Engineers (Corps) showed an increase in crude petroleum transport at the Port of Houston from 28.2 million tons in 1988 to 30.3 million tons for 1989. When the North American Free Trade Agreement becomes effective, traffic is expected to increase even more. The Houston Coast Guard recorded 273,450 gallons of oil spilled into the channel area in 1989.

The ecological consequences of oil spills vary according to whether the oil ends up on the surface, in the water column, or at the bottom of the bay. Oil remaining on the surface affects birds which swim through it as well as floating eggs and

larvae of marine fish. The specific effect on these organisms depends on many factors, including dosage and duration of oil exposure and season. Wind, waves and tides can act as benevolent forces that help contain slicks (this has fortunately been the case in two recent major oil spills in Galveston Bay), but these same forces can just as easily work against cleanup activities. Oil suspended below the surface affects fish and marine mammals, and often clings to floating particles such as algae and other vegetation. These particles are then ingested by both birds and fish. Oil that sinks will affect a number of species of bottom-dwelling fish, as well as crustaceans and shellfish such as crabs, shrimp, and oysters that account for over 90 percent of the bay fishing industry. Oil that penetrates bottom sediments may persist there for years.

The regulatory framework for spills focuses on developing response plans and preparing for emergency response; prevention is emphasized only in federal requirements for stronger ship hulls. Implementation of new spill regulations has been very slow in coming because of the complexities involved in coordinating all of these new plans. A response to a major spill can involve literally hundreds of government officials and private sector individuals, all of whom are authorized by federal and state laws to play specific roles. Completion of ongoing revisions to the National Contingency Plan (NCP) should alleviate some of the confusion and accelerate the promulgation of rules and regulations. Cooperative solutions sought by private industry that include large capital outlays for cleanup equipment should also improve future spill response mechanisms. In Texas, as elsewhere, the challenge for spill policy is to maximize spill prevention without causing undue burden to taxpayers, and minimize the environmental damage from accidental spills without crippling the industries that must pay for prevention, containment and cleanup. Prevention will be helped by licensing pilots and unlimited liability required under the 1990 Oil Pollution Act.

REGULATORY FRAMEWORK

Contingency Plans

Institutional response to spills is primarily governed by federal law as expressed in applicable contingency plans. CERCLA and the Clean Water Act (CWA) have resulted in three levels of federal contingency plans: the National Contingency Plan (NCP); the Regional Contingency Plan (RCP) covering several states; and the On-Site Coordinator Contingency Plan (OSCCP) covering the jurisdictional boundaries of the OSCs. Galveston Bay has two OSC plans, one for the upper part of the bay and one for the lower. Recent amendments to CERCLA and to the Clean Water Act are responsible for ongoing revisions to current federal plans. The Oil Pollution Act of 1990 (OPA) mandates revision of the NCP and all related plans. In addition, OPA created a fourth layer of federal planning called the Area Contingency Plan (ACP) that will be drafted by newly formed Port Area Committees. Distinctive elements in each plan are described below.

The National Contingency Plan. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) was developed to comply with requirements in both CERCLA and the CWA. Executive Order 12316 assigns EPA responsibility to

write, publish and revise the NCP. The NCP is significant in that it provides a framework for all other contingency planning. Revisions to the NCP in compliance with OPA will place more of the burden for spill prevention and response on the shoulders of the chemical, oil, and shipping industries. OPA is designed to be a comprehensive prevention, response, liability, and compensation plan for dealing with vessel and facility discharge of oil or hazardous substances. Full implementation of OPA will affect contingency planning at all levels as well as regulations stemming from new state laws. The basic tenets of OPA include a requirement for tankers and onshore facilities to develop oil spill response plans, a double-hull requirement for tankers, and provisions for the establishment of Port Area Committees to be staffed by an amalgam of local, state, and federal representatives. The ACP will be implemented in conjunction with the NCP and should be adequate to remove a worst case discharge.

The Regional Contingency Plan. Contingency plans must also be prepared for each standard federal region. The Region VI Plan covers Texas, Arkansas, Louisiana, New Mexico, and Oklahoma. The RCP provides for division and specification of responsibilities among federal, state, and local governments, and assigns roles to the private sector. It encourages preplanning for response by other levels of government and includes information on all useful facilities and resources in the region. RCPs are expected to follow the format of the NCP and to coordinate with state, OSC, and Title III local emergency response plans.

The RCP is written by the Regional Response Team (RRT). The RRT plays a crucial role in spill response planning because, to date, it is the only mechanism which brings together all levels of government for the purpose of coordinating response activities. The RRT also provides advice during actual response, and exercises sole decision making power on certain issues such as the use of dispersants, chemical agents, burning agents, and bioremediation agents. Its members come from federal, state, and local governments, and each member enjoys equal voting power. EPA and USCG representatives act as co-chairmen except when the RRT is responding to a spill, in which case there is only one acting chairman based on whether the spill is inland or coastal.

The RRT meets semi-annually to review response actions carried out during the preceding period and consider changes in regional and local contingency plans. The team reports on their activities to the National Response Team twice a year, focusing especially on their efforts to improve state and local coordination.

The On Site Coordinator Contingency Plan. The OSC is responsible for developing federal contingency plans for the local area under his/her jurisdiction. Federal law encourages that this be done in cooperation with designated local representatives. The USCG provides OSCs for oil discharges and for the immediate removal of hazardous substances in the coastal zone, while the EPA provides OSCs for the inland zone. The OSC area of responsibility should be clearly indicated in the RCP. The OSC contingency plan should identify all probable locations of discharges or releases, the available resources for responding to spill incidents, waste disposal methods, and a local structure for responding to discharges or releases. Size classes of discharges act as a guide to

the OSC in activating the plan. For oil, a minor spill is less than 1,000 gallons inland or less than 10,000 gallons coastal; a medium discharge is 1,000-10,000 gallons inland or 10,000-100,000 gallons coastal; a major spill is more than 10,000 gallons inland and more than 100,000 gallons coastal.

The State Role

The governor of each state has the authority to designate a state office to represent the state on the appropriate RRT. In Texas there are two representatives to the RRT: The Texas Water Commission (TWC) acts as the voting member for inland spills and all hazardous substance spills, while the General Land Office (GLO) takes the lead on marine borne oil spills. Federal law also authorizes the governor to designate an agency to direct state-led response operations, and coordinate communication with other state agencies. The Texas Water Code assigns this position to TWC; however, GLO has submitted a formal request to the governor's office to replace TWC in this lead role.

Federal laws encourage state participation and authorize states to develop their own contingency plans. Within the guidelines of the NCP, states are encouraged to develop laws which compel responsible parties to undertake cleanup, or to themselves undertake cleanup. In many cases, state-led cleanup activities are eligible for reimbursement from federal funds.

Texas law divides containment and cleanup activities among three agencies: TWC, GLO, and the Railroad Commission (RRC). Each has its own contingency plan, its own regulatory domain, its own notification procedures, its own civil and criminal penalties, its own enforcement mechanisms, and its own emergency spill response division. TWC and GLO have spill cleanup equipment.

TWC is the agency responsible for responding to all hazardous substance spills and to freshwater and inland spills of any nature and as such is responsible for implementing all Superfund activities under CERCLA and SARA. Tests for determining whether a spill substance is hazardous include ignitability, corrosivity, reactivity, or if the spill wastes are named as hazardous under federal regulations. Rules governing spills in the Texas Water Code provide only general guidance concerning cleanup standards. TWC policy requires that the responsible party return the site to pre-spill conditions or to background levels for the spilled substance. When this is not practical, health-based cleanup standards will be considered. If adopted, proposed revisions will allow TWC several optional cleanup schemes. These will most likely include: removal of all contamination; removal or decontamination to established health-based standards and or to levels considered safe through risk assessment; and removal or decontamination through engineering or institutional controls. Bioremediation is another option, which has been accepted by the agencies as a viable cleanup technology in particular cases. The Region 6 Bioremediation Spill Response Plan was drafted by state and federal agencies to provide guidance as to appropriate circumstances and methods for use of this new cleanup technique. Generally, the determination that a spill site within TWC jurisdiction is clean is made by local authorities

and/or a TWC field representative with guidance from TWC Emergency Response staff.

Oil Spill Prevention and Response Act (OSPRA) Until 1991, TWC was responsible for all spill activities in Texas with the exception of certain pipeline spills under Texas Railroad Commission jurisdiction. New legislation passed in 1991 significantly altered this framework by transferring jurisdiction over coastal oil spills to GLO. Specifically, GLO jurisdiction under OSPRA extends to any site where an unauthorized discharge of oil, not abated or contained, could enter coastal waters within 12 hours. OSPRA allows Texas to establish regulatory requirements that differ from federal requirements if there is a substantial state interest to protect. OSPRA's basic tenets are discussed below:

Notification and Response. OSPRA requires all spills, no matter how small, to be reported to the state. It also provides for strategically positioned state on-scene command posts that will serve as a single point of communication and coordination for state oversight and coordination and response actions. The State On Site Coordinator (SOSC) for the Galveston Bay area is located in League City. This same office will carry out enforcement activities under the prevention aspect of OSPRA.

Facilities and Vessels. Coastal facilities handling oil must obtain a discharge prevention and response certificate from GLO. These facilities are classified according to oil storage and transfer capacity as either exempt, small, or major. GLO is currently receiving applications for certification from small and major facilities, and expects to complete processing of these applications by January 1993. Applications require detailed information from the facility including a list of all past spills, detailed response plans, and proof of financial responsibility. A regulated facility may not handle oil after January 1, 1993 without a discharge prevention and response certificate issued by GLO.

In addition, OSPRA requires written contingency plans for tankers, barges, lightering operations, and onshore oil and chemical facilities. Unlike OPA, which requires vessel contingency plans from cargo-carrying tankers only, OSPRA requirements apply to any vessel with a capacity to carry or contain 10,000 U.S. gallons or more of oil (including fuel). The teeth of OSPRA and its resulting contingency plan (still in draft form) will be regulating facilities and vessels. Enforcement will include audits, drills, inspections, and denial of entry into port for non-complying vessels.

Funding and Liability. In the past, state funding available for spill response has been subject to a \$5 million cap. The effects of this low cap have been partially offset by a mechanism that reimburses some state cleanup activities through federal funds. OSPRA creates a state fund (the Coastal Protection Fund) that will allow GLO to take a more proactive role in oil spill prevention and response. The fund has a \$50 million cap that will be initially supplied and replenished as needed by a 2 cent barrel tax on oil. When the initial fund reaches \$25 million, this fee will cease until the fund drops below \$14-million, but it allows the fund to

rise to \$50-million through collection of penalties and reimbursements for spill cleanups.

The Coastal Protection Fund will be used to establish the SOSC offices, clean up spills if a responsible party cannot be identified, purchase equipment, and conduct post-spill damage assessment studies. Other funding for meeting the state's obligations under OSPRA will come from fines and penalties. Spillers can be fined 3 times the cleanup cost if they do not respond appropriately. OSPRA has no thresholds for imposing fines. Unlike TWC or federal agencies operating under OPA, GLO plans to impose fines for any oil spill no matter how small.

Both OPA and OSPRA require proof of financial responsibility, onboard cleanup equipment, and an onboard designated spills coordinator. However, these requirements apply to fewer vessels under OPA than under OSPRA. OPA applies only to tankers, not to barges. OSPRA applies to any vessel (including barges) that can carry 10,000 gallons of cargo and/or fuel. Federal law allows states to implement laws and regulations that exceed the stringency of federal laws. However, Texas has chosen to model OSPRA implementation after OPA implementation. This is unfortunate because the proposed "Vessel Rules" drafted by the Coast Guard to implement OPA are weak and many observers think they have watered down the intent of OPA. These rules have yet to be approved, and there is an opportunity to have them rewritten.

Discharge Cleanup Organizations. OSPRA requires appropriate geographic distribution of industry discharge cleanup organizations in the coastal area for the purpose of insuring sufficient and timely response capability. Industry organizations must be certified by GLO in order to be listed on a vessel or facility discharge response plan. Volunteer cleanup organizations in Texas are certified and regulated by the Texas Parks and Wildlife Department (TPWD) since past contingency plans have limited them to handling wildlife rehabilitation. New contingency plans are likely to broaden the potential for volunteer intervention because of the so-called "good samaritan" clauses in OPA and OSPRA that authorize private parties to aid in cleanup without being subject to liability except in cases of gross negligence. This clause will play a crucial role in allowing Galveston Bay to benefit from the expensive high-tech equipment and technical knowledge of industry cooperatives.

The Railroad Commission. The Railroad Commission regulates small coastal discharges, pipeline discharges, and discharges related to oil and gas exploration. Paragraph 3.8 of the Texas Natural Resources Code gives the RRC responsibility for clean up of any crude oil spill under 240 gallons originating from a pipeline or from an offshore rig. Any refined product spill (hazardous substance) remains under the jurisdiction of TWC, and GLO assumes responsibility for crude oil spills in excess of 240 gallons. The RRC relies on private contractors for its clean up operations because it does not have any dedicated resources for spill clean up. The RRC currently has no contingency plans for responding to waste spills associated with exploration and production (such as produced water).

The Local Role

In general, federal laws regarding local participation in spill prevention and response are very vague and relegate these governments to technical and logistical support roles. SARA Title III establishes Local Emergency Planning Committees (LEPCs) and requires them to prepare an emergency response plan to be reviewed at least once a year. These plans include such items as identification of facilities subject to Title III emergency planning requirements and routes to and from these facilities; procedures to be followed by facility owners and operators and emergency response personnel in the event of a release; designation of a community emergency coordinator and facility emergency coordinator; and communication procedures and evacuation plans.

Local governments may participate in RRT activities if provided for by state law. However, under OPA regulations, local government officials will definitely be represented on the new Port Area Committees. In addition, OSPRA calls for local participation in the formulation and implementation of the statewide contingency plan for oil spills. One regional committee for Galveston Bay will provide a forum for citizen input. This provision was added to OSPRA only after local organizations protested loudly when it did not show up in the state law's first version. Community meetings hosted by the Galveston Bay Foundation (GBF) and regional lobbyists played an influential role in getting this language included. GBF and others wanted to ensure that a top-down state plan was not going to be imposed upon the bay communities. In the future, GBF plans to use its shoreline mapping project to help organize government spill response activities at the local level.

The Private Sector Role

Large spills in the bay are costly to industry as well as to the environment. Closures in the bay's navigable waters add to the expense of clean up and penalties. During the Apex spill in 1990, the Houston Ship Channel's closure cost the shipping industry nearly \$1 million a day. When the channel reopened, 40 vessels were waiting to get into the Houston Port and 10 were waiting to leave according to the Coast Guard. The delays were estimated to cost \$10,000 to \$20,000 each day for each vessel.

Industries affected by spill regulations include the oil, shipping, chemical, and fishing industries. A party causing a spill is subject to four potential types of liability. First, the responsible party must pay the cost of cleanup. Second, that party is subject to the imposition of civil and/or criminal penalties. Third, the party is required to compensate the public for damage to natural resources. Fourth, parties may be liable to private persons for injury to persons or property. Both OPA and OSPRA require proof of financial responsibility and a certified contingency plan from oil and chemical companies and their cargo transporters for responding to a "worst case" spill. These vessels are also required to carry clean up equipment and have a designated spills coordinator on board.

New legislation has redefined "worst case" spill to mean the loss of a tanker's entire cargo. As a result, the private sector has been forced to increase its response capability 10 to 15-fold. Protection and Indemnity Clubs and Industry Cooperatives spread the risk of liability for these companies as well as the cost of developing a capability to respond. They also assist members in getting their contingency plans approved. While these clubs primarily provide clean up services to members, they are also prepared to respond to non-member large spills if called upon by the OSC.

The Marine Spill Response Corporation (MRSC) and Clean Channel are the two Industry Cooperatives in the bay area that are working to contain the high cost of spills and minimize their occurrence. The MRSC is a nonprofit group directed by a retired Coast Guard admiral and funded by major oil, pipeline, and shipping companies. It plans to spend nearly \$1 billion by 1996 to enhance the inventory of spill fighting equipment along U.S. coastlines. The equipment will be used to battle only the nation's biggest oil spills. \$400 million will be spent on capital equipment and \$35 million on research and development. The group also plans to build 16 offshore cleanup vessels.

The Clean Channel initiative is an industry cooperative for responding to large oil spills of 10,000 gallons or more in Galveston Bay and its tributaries including the Houston Ship Channel and the Gulf Intracoastal Waterway. Like MRSC, Clean Channel will operate on a nonprofit basis, and will respond to member companies' oil spills and certain chemical spills. There are fifteen member companies, each of which operates in the HSC. Foreign vessels are eligible for non-voting, non-member subscriptions. The cooperative only recently broadened its membership for response to the entire bay and plans to respond to spills from docks as well as facilities and vessels. Clean Channel has two barges in the bay area: one operations barge in Barbour's Cut, and one skimmer barge in Galveston. A second skimmer barge will be stationed at Barbour's Cut in February 1993. When a call comes in, crew must be at the equipment site within two hours. Clean Channel has thus far spent \$700,000 on equipment.

Implementation

When a vessel-related marine disaster occurs on navigable waters of the U.S. and substantially threatens public health or welfare because of an actual or potential discharge of oil or hazardous substances, the CWA and Executive Order 11735 authorize EPA and the Coast Guard to coordinate and direct all public and private abatement efforts, and to remove and, if necessary, destroy the vessel. EPA and the Coast Guard must operate within their respective designated OSC zones. The federal OSC by law acts as the principal overseer of all cleanup operations whether they are carried out by the responsible party, the state, or the federal government. Spill operations are usually carried out by industry experts that contract with the responsible party. State and federal government become involved only if the problem escalates beyond the capacity of the responsible party's contractors. On a more routine basis, state and federal officials coordinate to contain and clean up so-called "mystery spills."

When a spill occurs, the following actions should ensue: First, the party responsible for a spill is required to notify the National Response Center operated by the Coast Guard and the State OSC immediately. When the National Center is notified, lead responsibility for the spill is immediately assumed by the Coast Guard or EPA, depending on the location and type of emergency. The first official from an agency with responsibility under the RCP arriving at the site coordinates activities until the OSC arrives.

In directing response operations, the OSC coordinates his/her efforts with other appropriate federal, state, local, and private response agencies. The OSC consults regularly with the RRT in carrying out the plan and keeps the team informed of activities. In some cases, the federal OSC has preapproval from the RRT to take certain actions should the situation escalate. The RRT may be activated when a discharge or release exceeds the response capability of the OSC or crosses regional boundaries, or when it poses a substantial threat to the public health, the environment or to regionally significant amounts of property. When activated, members meet at the call of the chairman and assist and advise the OSC, request other federal or state or local governments or private agencies to provide response resources under their existing authorities (such as requesting the use of local equipment, personnel, technical advice), and help the OSC prepare information releases for the public and for the National Response Team. For particularly threatening spills, the OSC may be assisted by a national strike force team, and an environmental response team.

As soon as possible, the OSC advises the appropriate state agency of reported discharges and releases. The first state OSC arriving at the site will determine whether or not state response is required by assessing the discharge and/or ongoing clean up operations. In the event of a spill, OSPRA authorizes GLO to coordinate all response actions until TWC can assume responsibility over the cleanup.

The federal OSC determines when a cleanup is complete. He/she can do so unilaterally, but usually does so in conjunction with the state OSC, the spiller, and in serious cases, the RRT. If natural resources are, or may be, degraded by the discharge, the OSC shall ensure that state and federal trustees of affected natural resources are notified so that they may take appropriate actions.

Analysis of Implementation. In 1990, two major oil spills (the Apex and the Mega Borg) threatened Galveston Bay with serious environmental damage. The June 1990 explosion and fire aboard the Mega Borg tanker dumped 4 million barrels of crude 57 miles off the coast of Galveston. In August 1990, the Apex spill (named after the barge that discharged 700,000 gallons of crude into the bay) occurred inside the Houston Ship Channel when the tanker Shinoussa failed to maneuver around the barge and rammed it, breaking it in two. The incidents helped make Texas the nation's oil spill leader in 1990 (5.43 of 13.4 million gallons spilled nationwide) and brought to light many of the weaknesses in implementing the current regional and state contingency plans. These weaknesses include over-politicization, lack of inter-governmental coordination, and lack of follow-up spill management evaluation.

Critics cited bureaucratic delays in regional response mechanisms that slowed the federalization process and prevented early containment of the spill. In the critical early stages of the Apex spill, on-site authorities attempted but were unable to contact several of the RRT members. The RRT did not meet until four days after the accident. By the time the cleanup was federalized, the spill was so large that equipment had to be brought in from regional headquarters in Louisiana. Bioremediation measures took another several days to approve and activate. Finally, nearly two years after the incident, there is still no official damage assessment or management evaluation report available on the Apex spill. The Department of Transportation has, however, published an accident report.

Reaction to a recent incident in Kemah highlights another policy coordination problem in the bay area, i.e. it is the only large bay system in the U.S. that is divided between two Coast Guard authorities (Houston and Galveston). When a sizable "mystery spill" was discovered in Kemah recently, the Coast Guard is reported to have waffled on whose zone the spill was in and delayed cleanup. Exercising its new authority under OSPRA, GLO cleaned up the spill. In the past, there has been resistance to the idea of merging the two Coast Guard authorities because of internal political pressure and lobbying from pilots who fear losing their clout in the event their Port Authority is absorbed. However, recently drafted plans for merging the two ports have been approved at CG headquarters, and await Congressional approval and funding. The new CG authority will be neither in Houston or Galveston, and is likely to be centrally located in an area such as Clear Lake. A single authority should greatly facilitate spill response.

In addition, Galveston Bay will benefit in the future from a bay-wide coordinated contingency plan. The Area Contingency Plan (ACP) that will be written by the members of the still-evolving Area Committees will be a good barometer for gauging the willingness for intergovernmental cooperation as well as cooperation with the private sector and public citizen groups. The Coast Guard is working to establish a single unified Houston/Galveston Area Committee to replace the two separate committees and is attempting to make the ACP a collaborative effort among industry, environmental groups, and government entities. At a minimum, membership of the two ACPs will overlap. Local citizen organizations are working hard to ensure one plan for the bay. They have succeeded in getting the state to set up regional committees comprised largely of local representatives, some of whom will also sit on the Area Committee(s).

SPILL RISK FACTORS IN GALVESTON BAY

The Houston Ship Channel

Local, national, and international traffic in the Houston Ship Channel continues to grow unabated. Total Port of Houston traffic alone increased from 124.8 to 125.5 million tons in 1989 and Texas City is the nation's 12th largest port with 41.2 million tons (U.S. Army Corps of Engineers. July 8, 1991, p. 1). Commerce in Texas coast jetty channels showed a 15 percent increase in 1989 to 293 million tons, led by the Galveston jetties that serve the ports of Galveston, Texas City and Houston. Table 5-1 shows the increase in shipping throughout the Galveston Bay area. Since foreign oil enters the country mostly by tanker, the trend toward increasing imports only increases the odds of new spills.

Potential tanker problems include explosion and fire, as well as collision with other vessels, offshore rigs, docks, or pipelines due to mechanical failure, drift or negligence. Pilots consider the Houston Ship Channel among the hardest in the U.S. to navigate, primarily because of traffic density and the channel's narrow width. At its widest and deepest points, the HSC is only 400 feet and 40 feet respectively. Ships passing through the channel average 100 feet in width and must travel around heavy barge and tow traffic near the shore. With docked ships lining the channel's banks, ships are forced to pass each other in dangerous maneuvers which sometimes leave only a 50 to 100 foot margin between ships. In addition, vessels frequently travel at full speed through the channel. The DOT report on the Apex spill affirmed that the ship channel is not wide enough for large vessels to meet or overtake safely without special precautions, and recommended that the Coast Guard study ways to improve navigation.

The Dredging Dilemma. The dangers posed by heavy traffic in the HSC is at the heart of current controversy over proposed widening and deepening of the channel. Houston voters have approved a \$130 million bond measure to finance the local share of a \$319 million project to widen the channel to 530 feet and deepen it to 45 feet. Proponents cite improved traffic safety along with economic gains as the primary advantages of further dredging. Opponents express skepticism over possible advantages. They claim that deepening and widening the channel will not improve traffic safety because it will only increase traffic and allow for wider ships with heavier loads. Thus, while a wider and deeper channel may decrease routine spills due to lightering (a process whereby large ships unable to navigate the channel transfer cargo to smaller ships at the mouth of the channel) it may increase the danger of catastrophic spills due to collision since tankers and barges will still be required to pass in close proximity to each other. Opponents also fear that dangerous toxics will be dredged up along with the bay bottom and released into the waters. This would not only contaminate state lands but adversely impact sport and commercial fishing industries. Dredging could also upset the salinity balance and endanger marine life because a deeper channel allows more salt water to enter on a lower level.

Table 5-1
Shipping to Galveston Bay Ports
(millions of tons)

Port	Category	1955	1960	1970	1980	1988
Houston Ship Channel	Total	47	57	65	109	125
	Foreign	7	10	17	54	65
	Domestic	40	47	48	55	60
Texas City Channel	Total	14	15	17	26	43
	Foreign	0.4	0.5	0.8	12	23
	Domestic	13.6	14.5	16.2	14	20
Galveston Harbor	Total	44	50	49	102	120
Galveston Channel	Total	6	6	3	10	12
	Foreign	4	5	2	7	9
	Domestic	2	1	1	3	3
Chocolate Bayou	Total	0.1	0.2	2.5	2.9	3.5
Minor Ports (000 tons)						
Double Bayou	Total	67	58	6	48	3
Anahuac Channel	Total	512	1072	480	271	3
Cedar Bayou	Total	532	228	487	329	275
Clear Creek	Total	44	136	397	21	NA
Dickinson Bayou	Total	425	432	457	19	722
Trinity R. Channel	Total	497	965	355	230	4

Source: Army Corps of Engineers, cited in Environmental Institute, A Socioeconomic Characterization of the Galveston Bay System, Clear Lake, August 1991, p. 5-3.

For these reasons, the Corps of Engineers has delayed seeking authorization to deepen and widen the HSC until 1994, pending completion of an environmental impact study. Some environmentalists advocate an offshore port instead of an "improved" channel. An offshore oil terminal allows supertankers to unload directly into a pipeline thereby minimizing both lightering and collision risks. Such terminals are reported to have unloaded about 1 million barrels of crude oil daily without a major spill in nine years.

Communications. Communications in the HSC is a problem for two reasons. The first is that pilots and shipmasters are not required to seek navigational guidance from the Coast Guard's Vessel Traffic Service (VTS). The VTS system is similar to air-traffic control systems in that it relies on radar screens and video displays to survey the channel. Port authorities can then relay messages to ships seeking guidance. Because VTS use is voluntary, vessels are free to proceed through the channel at maximum speed with no navigational guidance, even when passing other vessels.

Mandatory use of VTS (as well as adherence to VTS advice) for all channel-going traffic should be explored. (OPA makes VTS use mandatory only for certain waterways, such as Prince Edward Sound, and then only because environmental groups lobbied to have these special provisions added to OPA.) In its Accident

Report, DOT found irresponsible navigation and failure to reduce speed to be the cause of the Apex accident. The tanker pilot who failed to reduce the vessel's speed was, however, under no legal obligation to do otherwise. Nor did the pilot seek guidance from VTS, even though the DOT report found that a significant reduction in speed would have been advisable. The DOT report also found that both tankship pilots involved in the accident did little or no planning to determine how they would pass each other in the presence of the Apex barge. Had VTS use been mandatory, the Apex spill may never have occurred. Signs at the mouth of channel with speed limits and international traffic symbols may also help prevent reckless behavior and accidents.

The second problem is that the channel's VTS has a five-mile "dead zone" between the Bayport Channel and Redfish Island that is not covered by cameras or radar. Although the HSC VTS has 8 radar and camera surveillance points along the channel, there is a zone at the southernmost surveillance point (Morgan's Point) where the quality of the surveillance is dependent upon the weather. This will cease to be a problem when a new radar is installed to compensate for poor camera visibility during inclement weather. The CG also plans to elevate the camera at this site an additional 40 feet for better visibility as well as increase the power of the lens. In addition, three new camera sites are planned along the channel.

Pilots. All commercial carriers (including foreign vessels) operating in other than high seas must have a pilot aboard when underway. Ship masters entering the HSC rely on pilots to guide them through the 53 mile long channel. As a ship leaves port in the HSC, one of the 57 pilots in Houston will board it and guide it into the open sea. This is usually a five to six hour trip. The pilot then boards a waiting boat that returns him to port. The procedure is reversed for incoming ships.

Pilots are independent contractors and are licensed by state and federal government. Those licensed by the Coast Guard are required for vessels operating between US ports. Pilots licensed by state authorities are required for vessels operating between a foreign port and a US port. In Texas, the Governor licenses pilots based on recommendations from the Board of Pilot Commissioners for each district. Because each district has its own set of commissioners, there has been no structured growth in the laws governing the licensing and operation of pilots in Texas waterways. Each pilot group is treated somewhat differently and each waterway has its own rules. Pilots in the HSC operate under a state license and are therefore also required to hold a federal license. Formal training is not a prerequisite to being licensed, but HSC pilots must have served two years as a deputy pilot in the channel. Barge traffic under 10,000 gross tons and tow boats are not required to have pilots aboard. In light of the Apex spill, pilot requirements for barges and tows should be reconsidered.

Pipelines and Produced Water

Pipelines. Between 1980 and 1989, 3910 spills from land-based pipelines released nearly 20 million gallons of petroleum into U.S. waters, and accounted for about

15 percent of all oil pollution during this period. Many were caused by the rupture of the pipe due to corrosion, damage by an outside force, or the failure of a valve or gasket.

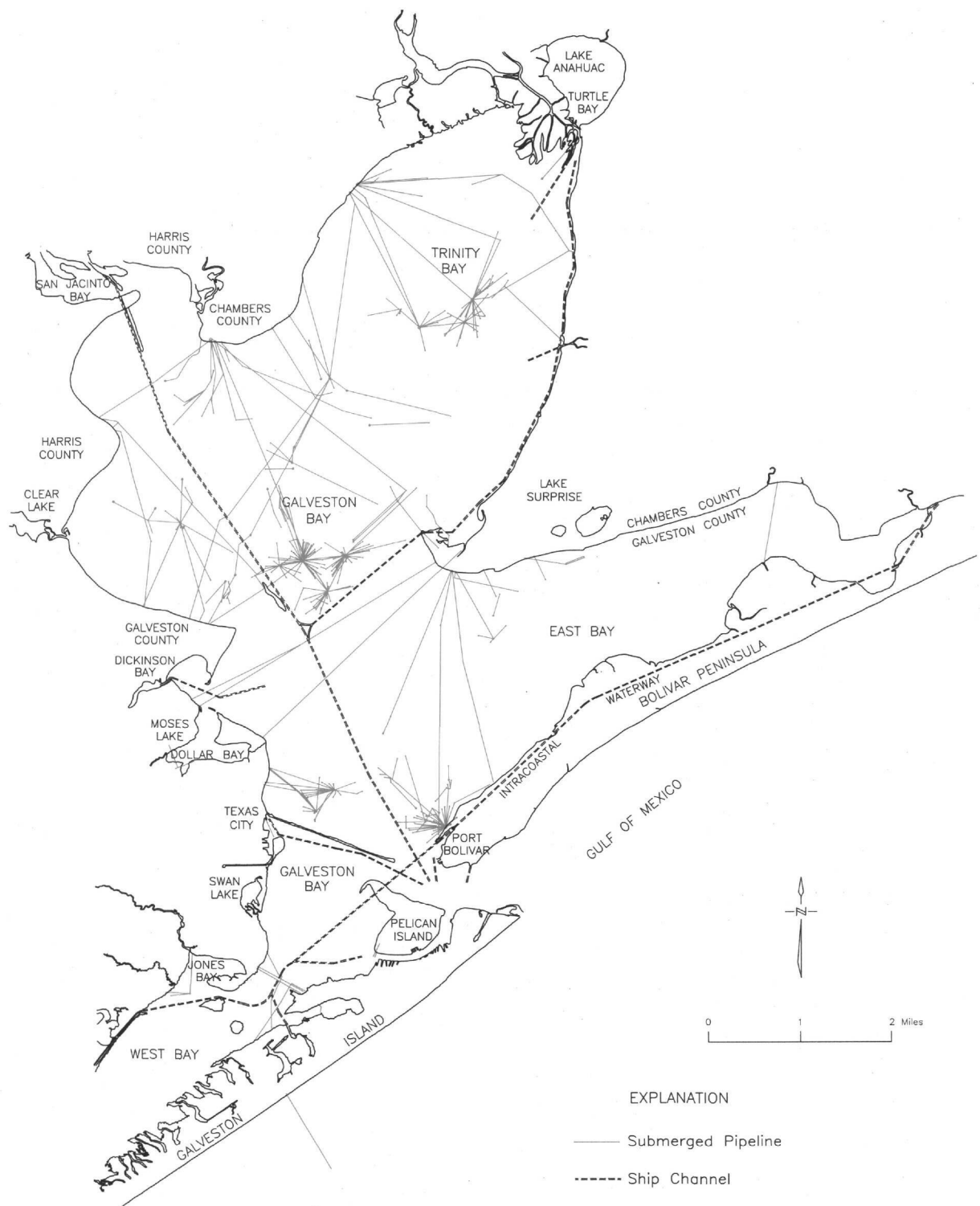
Pipelines are a major form of transportation for oil, liquid gases, and other toxic liquids within the state of Texas. Galveston Bay is home to extensive oil exploration activity, numerous offshore rigs, and a maze of shoreline and submerged distribution pipelines. Figure 5-1 illustrates the pipelines running under the bay. In 1991, a 10 inch Amoco pipeline burst at High Island and spewed more than 40,000 gallons of oil into the Gulf Intracoastal Waterway. The pipeline broke while workers were transferring light crude oil to a barge at a High Island terminal. Pipelines buried in shallow offshore waters can also be the site of accidents with fishing boats and other vessels.

The state of Texas owns 95 percent of the Galveston Bay bottom, including marshes and other wetlands below the mean high tide. Much of the royalty payments from leasing this land (including pipeline leases) are dedicated to the Permanent School Fund (PSF) which supports public school education. Royalties from oil wells on state-owned tracts in the bay contributed \$5.1 million to the PSF in 1989. Lease sales contributed \$5.25 million and rentals from existing leases \$1.09 million. From 1985 to 1990, lease income for pipelines amounted to \$1.11 million. These large sums make any regulation regarding the leasing of state-owned tracts a politically sensitive issue.

Anyone wanting to install a submerged pipeline in GB must obtain an easement (i.e. lease a tract) from GLO and a pipeline permit from RRC. Yet once the permits are granted, pipelines are for the most part self-monitored and maintained by their owners and operators. This is primarily due to insufficient enforcement staff. District office staff inspect oil and gas facilities, respond to emergencies and complaints, monitor tests required under RRC rules and permits, witness casing and plugging operations, and perform other duties as needed. Although enforcement efforts are substantial, they do not suffice as a deterrent to violations. The RRC does have a few personnel for pipeline safety regulation, but staffing is generally inadequate and there is frequent turnover because of the low pay. Field inspectors conduct lease inspections, but at current staffing levels only 18 percent of the oil and gas leases in the state are inspected year. Inspectors therefore focus on problem areas and sometimes conduct area-wide inspection sweeps. In the Houston RRC Office (which oversees the entire Galveston Bay area) five enforcement officers monitor 46,000 miles of pipeline. (This figure does not account for interstate pipeline and other pipelines that are exempt from statewide safety regulations.) In addition, the enforcement staff is not adequately equipped to monitor submerged pipelines and must rely upon the owners to comply.

Produced water. The American Petroleum Institute estimates that in stripper oil wells (which comprise 70 percent of all wells in Texas), yield approximately nine barrels of water for each barrel of oil. Once separated from the oil, this "produced water" or "oilfield brine" is either deep-well injected or discharged to surface waters. While 61 percent of produced water in Texas is disposed of through

Figure 5-1
Submerged Pipelines in Galveston Bay



Source: General Land Office

injection wells, in coastal areas it is also disposed of in tidal waters. Produced waters typically contain high levels of dissolved salt, and can contain trace metals and hydrocarbons.

According to the Fish and Wildlife Service (FWS), the chronic exposure of estuarine habitats to brine pollution is potentially more damaging than accidental oil spills. High salinity kills emergent marsh plants, and areas where sodium has accumulated in the sediment can take years to revegetate. Trace metals and hydrocarbons can bind with sediments creating unsuitable habitat for bottom-dwelling invertebrates. Discharges are most deadly for marshes and protected shorelines with slow-moving waters that do not allow the brine to mix well. An ongoing RRC study will determine the level and geographic distribution of naturally occurring radioactive waste (NORM) in produced waters discharged into coastal waters.

Recent estimates show that approximately 137,000 barrels per day of produced water are being discharged into the Galveston Bay system from approximately 62 sources, much of it into bayous and shorelines. As already pointed out in Chapter 3 on point source pollution, the RRC regulates all activities related to brine discharge and issues tidal disposal permits based on applicable surface water quality standards and acceptable water/petroleum ratios (<25 ppm). Produced water permits issued within the last three years have five-year terms, while permits for discharges of gas plant effluent have no expiration dates. RRC permit monitoring procedures include quarterly self-reports that must provide average and maximum monthly discharge volumes. Permitting and monitoring problems identified by FWS include: inaccurate estimates based on well potential instead of actual flow, inconsistent self-reporting, inaccurate description and marking of discharge locations, and insufficient consideration given to ecological sensitivity.

Enforcement measures include pipeline severances and administrative penalties, all of which are discretionary. Gas plant effluent requires no sampling, analysis or monitoring. Legal enforcement cases are backlogged due to staff turnover and a lack of experienced examiners.

In addition to state permitting, the EPA has drafted proposed rules for a general permit for coastal brine discharge. The proposed rule prohibits discharges to marshes, wetlands, swamps, bayous, or coastal bays from all wells, including stripper wells. Cities may also enact ordinances relating to exploration and production activities. Possibilities include waste management ordinances for active drill sites within city limits.

The RRC has no contingency plan requirements for exploration and production waste and does not require reporting of spills of produced waters or hazardous substances. However, RRC is apparently drafting revisions to Rule 20 in this regard, and developing formal standards and procedures for clean up of such spills. There appears to be no specific statutory or regulatory requirements for ensuring spill-proof, leak-proof production facility construction to prevent spills and leaks other than the requirement that an operator must consider Rule 8 in constructing production facilities. The same is true for inspection and

maintenance of production facilities. Operators must maintain the integrity of equipment at facilities. Rule 8 prohibits an operator from causing or allowing pollution of surface or subsurface water in the state.

RRC should have a standing advisory group for evaluating the effectiveness of its exploration and production waste management program. Good record on public participation in rulemaking process but this is just the front end of the process, need someone evaluating actual implementation and enforcement. Generally, disposal well permits do not have expiration dates and waste analyses are not required to be submitted prior to approval or as part of the permit procedure.

Technology and Equipment.

Texas is in need of a combined public/private sector spill response equipment inventory. Federal and state authorities overseeing spill response in Texas are lacking comprehensive information on existing equipment already in place. At the federal level, Coast Guard officials are reluctant to purchase new equipment because they fear they will needlessly duplicate equipment purchases by the private sector and thereby violate congressional mandates to avoid government waste. At the same time, the Coast Guard believes greater government investment may be necessary to ensure an effective response to worst-case spills in spite of proposed private sector investments of about \$900 million in equipment, facilities and trained personnel.

A statewide equipment inventory would also assist in maximizing new equipment purchases planned for the near future. GLO will use the Coastal Protection Fund (CPF) to purchase some new spill response equipment for the state. In selecting equipment, GLO will attempt to be prepared to handle small spills and minimize damage of large spills until private contractors with more sophisticated equipment arrive at the spill site.

Spill response officials operate from a rotating list of private contractors who are certified by state and federal authorities. However, not all contractors are appropriate for all spills, and there is a certain amount of guesswork involved in operating off the information provided on the rotating list. State officials are working on a computerized, descriptive inventory of contractors so that they can select knowledgeably. For this reason and other reasons, funds should be made available for improved information systems. The annual equipment budget may be one appropriate place for designating such funds.

State officials are also putting together a GIS system for spill response purposes. It is largely funded by the state, but the EPA has contributed some money for specific projects. It will inventory such things as equipment, people, where boat ramps are, habitat, etc. Also the Galveston Bay Foundation, a public citizen's group, is working on a shoreline inventory of the bay in cooperation with a number of state and local agencies. The project involves mapping shoreline for environmentally sensitive areas, seasonal wildlife, vegetation patterns, water access for spill response and cleanup equipment, and other information that will

provide a complete description of all resources necessary to accomplish shoreline protection.

When completed, this system will allow implementors to be aware of what areas need to be protected geographically and seasonally before a spill occurs. Combined with the statewide GIS system (government officials should ensure that the two are integrated), the shoreline inventory will greatly enhance the state's capacity to activate an appropriate response as soon as a spill occurs. Funding for information systems which assist in compiling post-spill damage assessment reports and management evaluations is also in order. Such reports are required by federal law to be conducted within sixty days following final clean up of a spill, but officials are slow in initiating these reports and no mechanism exists for disbursing money for the study. Without such reports, RRT response activities are too much of an ad-hoc process.

EVALUATION

Of the 215 spills in the Houston Ship Channel in 1991, all but one were considered minor because less than 10,000 gallons of oil were dumped. However, the possibility for major spills increases with every annual increase in the amount of ship traffic. Because of the drama of the large spills, most regulatory effort has gone into controlling them, largely through a complex set of emergency response plans. However, the cumulative effects of small spills, although poorly understood, must also be harmful to the environment, and virtually no effort is expended in minimizing their effects.

The most outstanding feature of spill regulation is its focus on response planning. Indeed, the state considers a contingency plan for response to be a prevention plan. We think that incentives for active prevention should be developed. The effectiveness even of the kinds of planning now called for is limited, however, by several factors, including the absence of good inventories of shoreline facilities and features, of contractors' capabilities, and of available response equipment. The existence of two Coast Guard authorities further complicates the likelihood of rapid and effective response. Efforts should be made at the national level to expedite the merger, and measures taken to ensure adequate funding. Finally, environmental scientists should be more fully involved in cleanup, especially in determining when cleanup is complete.

As in other areas we have examined, enforcement is limited by lack of both resources and interest. The State Response Center in League City will monitor vessels and facilities randomly and unannounced, but has only six staff people to perform this function. Under OSPRA the state has the authority to board vessels in the bay. OSPRA will monitor vessels with the help of the Coast Guard for both boarding vessels and making sure they have a contingency plan on file. The state fines a minimum of \$500 for a spill of a barrel or less. Federal authorities also have the authority to fine for any spill, no matter how small, but they usually do not impose fines for small ones. These penalties should be enforced. We have identified some methods for genuine prevention, including requiring pilots and use of the Vessel Traffic Service (VTS) for all channel-going traffic, and installing

VTS in the 5 miles of the Houston Ship Channel where it does not exist. Other methods for increasing the crew's accountability for dangerous actions, such as not reducing speed, would further increase safety and diminish the likelihood of spills.

Keeping tabs on many vessels and facilities is a difficult and complex task. One advantage of the planning approach that characterizes most spill response regulation today, in addition to improving spill response itself, is that it heightens everyone's awareness of the problem and calls attention to the need for spill prevention. Its disadvantage is that it cannot be tested until a spill occurs; if it fails, it will be too late. For this reason, additional attention should be paid to prevention. Similarly, we cannot overemphasize the prevention of small spills. Small spills sometimes occur at the same site or same facility on a regular basis. While the cumulative effects of these daily spills is relatively unresearched, there is evidence that they accumulate in marshland sediment and contribute to wetlands loss by destroying marsh grasses.